Amended Claims

What is claimed as being new and desired to be protected by Letters Patent of the United States as follows:

1. A method and system to support customized multi-priority services over any data-link communication layer frame type **carrying user information data**, comprising the steps of:

(a) assigning and reserving single or plurality of bytes, known as sub-framing bytes, in the location(s) preferably adjacent to the trailing bytes of said data-link layer frame;

(b) assigning and reserving single or plurality of bytes being uniquely identified through a fixed byte(s) distance from the trailing or ending flag of said data-link layer frame;

(c) splitting each said data-link frame carrying user data into so-called data-link layer segments, each said segment carrying portion of user data frame along with sub-framing byte(s) as defined through (a) and (b); and,

(d) appending an updated CRC (Cyclic Redundancy Check) or FCS (Frame Check Sequence) field that covers data-link layer segment header, information bytes included in the segment and sub-framing byte(s).

2. The method and system according to claim 1, wherein sub-framing byte(s) in a data-link layer frame/segment has the functionality, comprising the steps of:

using the bit values of the said sub-framing byte(s) to generate and represent a sequence numbers such that an individual sequence number can be used to identify and associate with a unique priority service class that needs to be transmitted or received over a single or multiple communication links;

using the bit values of the said sub-framing byte(s) to generate and represent a range of sequence numbers such that each range of predefined sequence numbers can be used to identify and associate with a unique priority service class that needs to be transmitted or received over a single or multiple communication links; and,

interpreting the bit values of the said sub-framing byte(s) in a manner that uniquely identify a class priority associated with a data-link layer frame.

3. The method and system according to claim 1, wherein the said method and system dynamically calculates and update the CRC or FCS field as each byte of a data-link frame is transmitted through the said system.

4. The method and system according to claim 1, wherein the said system can split or interrupt the ongoing transmission of any type of data-link layer frame/segment, comprising the steps of:

determining the byte position where the ongoing transmission of a data link layer frame needs to be interrupted;

inserting the sub-framing byte(s) following the interrupting byte position of the data link layer frame/segment;

inserting the updated CRC or FCS value following the sub-framing byte(s) position; and,

inserting the closing flag following the CRC or FCS value of the data link layer frame/segment.

5. The method and system according to claim 1, wherein the intermediate data-link layer devices or switches which are not aware of the said system and method transparently pass the data-link frames/segments containing the sub-framing byte(s).

6. The method and system according to claim 1, wherein the said method and system use the sub-framing byte(s) for prioritizing, comprising the steps of:

means of using customized multi-priority algorithm; and,

means of assigning weight parameters to a service class represented by the sub-framing byte(s) such that the assigned parameters can be static or dependent on other transmission or user defined variables;

7. The method and system according to claim 6, wherein the transmission priorities of data-link layer frames on a per byte basis or in any proportion can be statically defined or dynamically linked with any type of transmission related parameters.

8. The method and system according to claim 6, wherein the said multi-priority algorithm provides a way to dynamically adjust and escalate the priority level of an initially declared low priority service to a high priority level.

9. The method and system according to claim 2, wherein the said system reserves and pre-assigns the position of a single or multiple bytes in a data link layer frame being transmitted on a single communication link such that certain possible sequence values generated by the sub-framing byte(s) can be uniquely defined and deterministically represent a service class without the need to identify any additional information enclosed in the data link header of the frames belonging to that particular service class.

10. The method and system according to claim 2, wherein the said method and system use a unique sequence number range defined by the sub-framing byte(s) within a data-link layer frame being transmitted on a single or multiple communication links such that

the assigned sequence range can uniquely represent a distinct service class without the need to identify any additional information enclosed in the data link header of the frames belonging to a particular service class.

11. The method and system according to claim 1, wherein the said method and system can re-use a uniquely identified sequence number range assigned through sub-framing service byte(s) for a particular service class being transmitted over a single or multiple communication links.

12. The method and system according to claim 1, wherein the said method and system use a uniquely identified sequence number range to identify multiple segments of a single frame received by a destination host over multiple links.

13. The method and system according to claim 1, wherein the said system supports a cut-through mechanism for faster transmission of a data-link layer frame through a data-link layer device, comprising the steps of:

transmitting a data-link frame on the outgoing link as soon as it is received by a data-link device;

interrupting the ongoing transmission of the said data-link layer frame over the outbound transmission link at any byte boundary of the transmitting frame;

appending the proper sub-framing byt(s);

appending the updated CRC or FCS that covers, header bytes, transmitted bytes and the sub-framing byte(s); and,

start sending a higher priority frame through the outbound transmission link as determined by any priority algorithm.

14. A method and system according to claim 1, wherein the said method and system can segment and transmit data-link layer frame, comprising the steps of:

splitting a data-link layer frame into multiple segments in any byte proportionality; and,

each segment containing framing header, user data, sub-framing byte(s) and updated CRC or FCS in accordance with claim 4.

15. The method and system according to claim 1, wherein the said system can assemble the sub-frames received over a single or multiple communication links, the method comprising the steps of;

receiving the segment(s) through single or multiple communication links;

identifying the segments belonging to a particular data-link frame through the information embedded in the sub-framing byte(s);

removing the sub-framing byte(s) present in each of the received segment(s);
verifying the calculated CRC or FCS value with the received CRC or FCS value as appended in the original frame; and,

assembling the received segments based on the information embedded in the sub-framing byte(s) of each segments to produce the original transmitted data-link layer frame.

16. The method and system according to claim 1, wherein the said method and system can modify the data link layer frame header to make it compatible with and acceptable to another and different traversing data link layer frame networks.

17. The method and system according to claim 1, wherein the said method and system has the ability to handle and accommodate concurrently a diversity of data link layer protocols on the same single or multiple physical layer communication links, the method comprising the steps of:

identifying the start and end of an individual data link layer frame at a receiving end through the flags or the sync bits pattern and not reading any information contained in header of the each of the received data link layer frames;

assembling the individual received segments through the information embedded in the sub-framing byte(s) to reproduce the original frame; and,

identifying the service class and type of a received data link layer frame by reading the sequence number contained in the sub-framing byte(s).

18. The method and system according to claim 1, wherein the said method and system can be interfaced with a Frame Relay network in a manner that requires only a single DLCI to carry multi-priority services on frame relay frames to a known destination, the method comprising the steps of:

identifying all the frame relay DLCIs and associating each of the frame relay DLCI with an individual and distinct service class;

assigning a unique sequence number in the sub-framing byte(s) for the frame relay frames representing each of the individual service classes;

changing all the individual DLCIs numbers identified in the data link header of each of the data frames to only one and single frame relay DLCI number;

identifying each of the individual frame service class at the receiving end by reading the sequence number defined in the sub-framing byte(s) of the individual frame; and,

re-mapping the service class identification sequence number to the corresponding DLCI number in the data link header of the frame relay frame.

19. The method and system according to claim 1, wherein the said method and system can be interfaced with any data-link layer based network, the method comprising the steps of:

at the transmitting side;

identifying the type of data-link layer network to be interfaced with;

assigning a unique sequence number range through the sub-framing byte(s) in the data-link frame/segment that needs to be transported;

enveloping the information including the sub-framing byte(s) within the native format of the data-link layer network that needs to be interfaced with;

transmitting the data-link layer frames over the desired data-link layer network;

at the receiving side;

removing the information along with the sub-framing byte(s) from the native received data-link layer frame;

identifying the original data-link layer frame format through reading the information embedded in the sub-framing byte(s); and,

enveloping the information back into the original data-link layer format.